

**Lab Manual: Exploring Anatomy & Physiology in the Laboratory  
– Core Concepts, by Eric Amerman, Morton Pub., 2014**

**LAB 1: Introduction to A&P and the Microscope  
Units 1 and 3**

**Unit 1: Introduction to Anatomy & Physiology (p. 1 - 30)**

*Exercise 1-1: Anatomical Terms, p. 5*

Anatomical terms (based on **anatomical position**):

Directional Terms:

Superior – Inferior

Anterior - Posterior

Medial – Lateral

Proximal – Distal

Superficial – Deep

Parietal – Visceral

Body Regions:

Abdominal

Antebrachial

Axillary

Brachial

Calcaneal

Cephalic

Cervical

Cranial

Femoral

Frontal

Lumbar

Nasal

Occipital

Pelvic

Scapular

Sternal

Tarsal

Thoracic

Umbilical

Vertebral

*Exercise 1-2: Body Cavities and Membranes, p. 10*

Major Body Cavities:

1) Dorsal Cavity

    Cranial cavity

    Vertebral (spinal) cavity

## 2) Ventral Cavity

Thoracic cavity

Pleural cavity

Mediastinum

Pericardial cavity

Abdominopelvic cavity

Abdominal cavity

Pelvic cavity

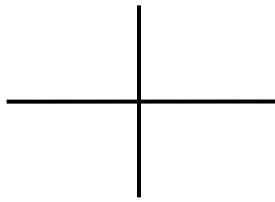
## Serous Membranes:

Pleural: Visceral &amp; Parietal

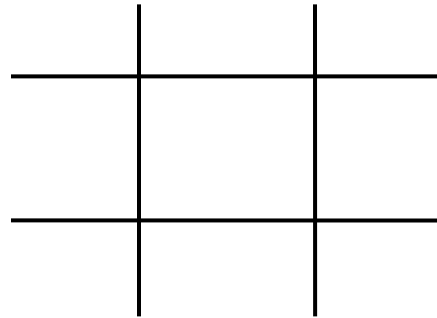
Pericardial: Visceral &amp; Parietal

Peritoneal: Visceral &amp; Parietal

## 4 quadrants:



## 9 abdominopelvic regions:


*Exercise 1-3: Planes of Sections, p. 18*

## Sectional Anatomy:

Sagittal

Mid-sagittal

Parasagittal

Coronal (frontal)

Transverse

Oblique

*Exercise 1-4: Organs and Organ Systems, p. 20*

Integumentary  
Skeletal  
Muscular  
Nervous  
Endocrine  
Cardiovascular  
Lymphatic  
Respiratory  
Digestive  
Urinary  
Reproductive

**Unit 3: Introduction to Cells and Microscope**

*Exercise 3-1: Introduction to the Microscope (p. 47-51)*

Parts:

Arm  
Base  
Lamp (light source)  
Stage  
Mechanical stage  
Ocular lens  
Objective lenses  
Iris diaphragm  
Nosepiece  
Coarse adjustment knob  
Fine adjustment knob

Terms:

Resolution

Working distance

Field of view

Parfocal

Depth of Field

Magnification vs. Total Magnification

| Objective lens | Magnification | (Objective x Ocular) = | Total Magnification |
|----------------|---------------|------------------------|---------------------|
| Scan           | 4x            | 4 x 10                 | 40                  |
| Low            |               |                        |                     |
| High           |               |                        |                     |
| Oil            |               |                        |                     |

Slides:

“e”

crossed threads

wet mount of hair

wet mount of cheek cells

live specimen (Paramecium/ Euglena)

**Lab 2: Diffusion, Osmosis, Tonicity**  
**Unit 3: Intro. to the Cell (p. 56-60)**

*Exercise 3-3: Diffusion, p. 56*

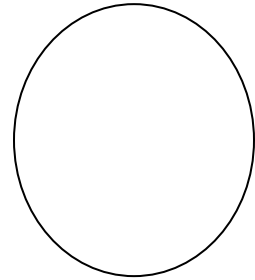
Def.:

Experiment 1: Diffusion in liquid (Groups of 4)  
 Observation of MeBlue in water:

Experiment 2: Diffusion in a semi solid medium (Groups of 4)

- petri dish with agar
- remove two small plugs of agar with a straw
- place  $\text{KMnO}_4$  (MW 158g) and MeBlue (MW 320g) within each well

Observation of the diffusion rate vs. molecular weight:



Experiment 3: Diffusion and Membrane Permeability (Groups of 4)  
 Color of solution in beaker:

Color of solution in dialysis bag:

IKI (iodine) → test for \_\_\_\_\_

positive test = \_\_\_\_\_

*Exercise 3-4: Osmosis and Tonicity, p. 58*

Def.:

Experiment 4: Thistle tube osmometer (DEMO)

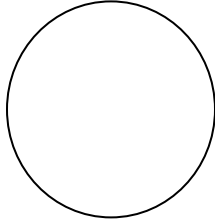
Molasses in thistle tube

Water in beaker

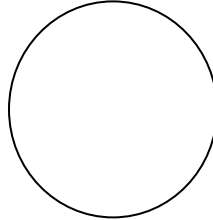
Experiment 5: Osmosis and living cells - red blood cells (Groups of 4)

Observe (under the microscope) RBCs in each of the following solutions:

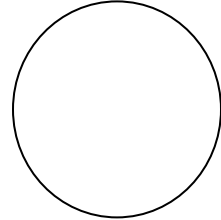
0.9% NaCl



100% dH<sub>2</sub>O



10% NaCl



Which solution was hypotonic? Explain.

Which solution was isotonic? Explain.

Which solution was hypertonic? Explain.

Did you observe hemolysis or crenation? Where?

**Filtration** (Groups of 4)

Def.:

Experiment 6:

Pour solution of copper sulfate, charcoal, and starch through filter paper in a funnel over an empty beaker.

Which passes through the filter paper into the beaker?  
Explain why or why not.

Copper sulfate:

Charcoal:

Starch:

**Lab 3: Cell Division and Epithelial & Connective Tissue**  
**Units 3, 16, and 4**

**Unit 3: Introduction to the Cell (p. 61-64)**

**Unit 16: Reproductive Systems (p. 415-418)**

**Unit 4: Histology: The Tissue Level of Organization (p. 71-83)**

*Exercise 3-5: Mitosis and Cell Cycle, p. 61*

Cell Cycle = Interphase + Mitosis

Interphase:

G<sub>0</sub>:

G<sub>1</sub>:

S:

G<sub>2</sub>:

Mitosis (M phase):

Prophase:

Metaphase:

Anaphase:

Telophase:

Slide: Whitefish blastula

*Exercise 16-3: Meiosis, p. 415*

*Exercise 16-4: Spermatogenesis and Oogenesis, p. 417*

Spermatogenesis

Oogenesis

Slides:

Testis

Sperm

Ovary

**Unit 4: Tissues (p. 71 – 83)**

Four main tissue types: \_\_\_\_\_  
 \_\_\_\_\_

*Exercise 4-1: Epithelial Tissue, p.72*

**Epithelial tissue:**

Know characteristics, functions, and locations for each tissue type.  
 Make a sketch of each cell type as you go through each of the slides.

Simple squamous:

Slide: Lung

Mesothelium

Simple cuboidal:

Slide: Kidney (tubules)

Simple columnar:

Slide: Villi of small intestines

Goblet cells

Stratified Squamous:

Slide: Esophagus

Skin – Palmer (epidermis)

Pseudostratified ciliated columnar: PSCCE

Slide: Monkey trachea

Transitional:

Slide: Transitional (urinary bladder)

*Exercise 4-2: Connective Tissue, p. 78*

**Connective Tissues:**

Adipose (Fat):

Slide: Adipose

Dense irregular CT:

Slide: Skin (dermis)



***Lab 4: Integumentary System***  
**Unit 5: Integumentary System (p.95-104)**

*Exercise 5-1: Skin Anatomy & Accessary Structures, p. 97*

Regions of Cutaneous Membrane:

Functions:

Epidermis

Dermis

**Epidermis**

Tissue type:

5 specific cell layers:

Stratum corneum

(or strata)

Stratum lucidum {thick skin only}

Stratum granulosum

Stratum spinosum

Stratum basale

**Dermis**

Tissue type:

2 specific layers:

Papillary layer

Reticular layer

**Hypodermis**

Tissue type:

No specific layers.

Not considered a region of the integument!

*Exercise 5-2: Histology of Integument, p. 100*

| <u>Slide #1</u>                               | <u>Slide #2:</u>                       | <u>Skin Model</u>                              |
|---|--|--|
| Skin palmer [Thick skin]<br>Identify: Regions | Scalp [Thin skin]<br>Identify: Regions | Identify: All terms listed<br>for slides plus: |
| Specific layers                               | Tissue types                           | Arrector pili muscle                           |
| Tissue types                                  | Hair follicle                          |  |
| Sweat glands                                  | Hair shaft                             |  |
|   | Sebaceous glands                       |  |
|   | Sweat glands                           |  |

| Tissue / Cell type | Regions    | Specific layers            |
|--------------------|------------|----------------------------|
|                    | Epidermis  | 1.<br>2.<br>3.<br>4.<br>5. |
|                    | Dermis     | 1.<br>2.                   |
|                    | Hypodermis |                            |